What Is Claimed Is:

1. A system for reducing the coherence of a wavefront-emitting laser radiation, in particular for a projection objective in semiconductor lithography, a first partial beam of the laser beam impinging on a surface of a resonator body being partially reflected and a second partial beam of said laser beam entering the resonator body and emerging from the resonator body again after a plurality of total reflections at least approximately in the region of the entrance location and being forwarded with the first partial beam jointly to an illumination plane, characterized in that the resonator body (9, 9') is formed in such a way that in addition to the splitting into partial beams (10a, 10b), the wavefronts and at least one partial beam (10b) are modulated during a laser pulse, the partial beams (10a, 10b) which are reflected at the resonator body (9, 9') and which enter the resonator body (9, 9') being superimposed downstream of the resonator body (9, 9'), and the resonator body (9, 9') being provided with a phase plate (12) having varying local phase distribution.

2. The system as claimed in claim 1, characterized in that the phase plate (12) has different thicknesses for the passage of the second partial beam (10b) of the laser beam transversely with respect to the beam direction.

3. The system as claimed in claim 2, characterized in that the differences in thickness are between 200 and 500 nm.

4. The system as claimed in claim 2, characterized in that the different thicknesses of the phase plate (9) vary in the transverse direction in a width s which is of the order of magnitude of the spatial coherence length of the laser radiation at the entrance plane (11).

5. The system as claimed in claim 4, characterized in that the following holds true for the width s: $0.05 < s < 1$ mm.

6. The system as claimed in claim 1, characterized in that the phase plate (12) is formed as a diffractive optical element (DOE) which is optimized to the zeroth order of diffraction.

7. The system as claimed in claim 1, characterized in that a diffusing screen is provided as the phase plate (12).

8. The system as claimed in claim 1, characterized in that the resonator body (9, 9') is formed as a prism having at least five corners.

9. The system as claimed in claim 1, characterized in that the angles of reflection in the resonator body (9, 9') are at least 37 degrees.

10. The system as claimed in claim 1, characterized in that the optical path length of the second partial beam (10b) in the resonator body (9, 9') is a multiple of the coherence length.

11. The system as claimed in claim 1, characterized in that the light impinging on the resonator body (9, 9') is split in a ratio of 1:3 to 2:3 with respect to the first reflected partial beam (10a) and the second partial beam (10a, 10b) circulating in the resonator body (9, 9').

12. The system as claimed in claim 1, characterized in that at wavelengths of the laser beam (10) of 157 nm or less, calcium fluoride is used as the resonator body (9, 9').

13. The system as claimed in claim 12, characterized in that calcium fluoride is chosen in a crystal orientation such that the first (100) crystal plane forms an angle of 45 degrees with the plane of the surface on which the laser beam impinges, and is perpendicular to a side face, the second (100)

crystal plane being parallel to said side face.

14. The system as claimed in claim 1, characterized in that the polarization direction of the laser beam impinging on the resonator body (9, 9') can be rotated relative to the plane of incidence for the purpose of setting a polarization state.

15. The system as claimed in claim 14, characterized in that the degree of polarization is adjustable between unpolarized and linearly polarized.

16. The system as claimed in claim 15, characterized in that a lambda/2 plate (18) is used for setting the polarization state.

17. The system as claimed in claim 8, characterized in that the prism (9') is formed in asymmetrical fashion.

18. The system as claimed in claim 17, characterized in that the prism (9') is provided with at least one asymmetrical side.

19. The system as claimed in claim 1, characterized in that the position of the centroid beam of the laser beam (10) impinging on the resonator body (9, 9') is eccentric.

20. The system as claimed in claim 1, characterized in that the resonator body (9') is formed in asymmetrical fashion, and in that the centroid beam of the laser beam (10) impinges eccentrically on the resonator body (9').

21. The system as claimed in claim 1, characterized in that the surface (11) of the resonator body (9, 9') on which the laser beam (10) impinges is provided with a splitter layer (17) in such a way that it influences the entrance angle of the partial beam (10b) entering the resonator body (9, 9').

22. The system as claimed in claim 21, characterized in that the splitter layer (17) has a varying thickness.

23. The system as claimed in claim 21, characterized in that the splitter layer (17) is formed in non-homogeneous fashion.

24. The system as claimed in one of claims 21, 22 or 23, characterized in that the splitter layer (17) has a dielectric layer.

25. A projection exposure apparatus for semiconductor lithography with a laser as a light source, an illumination system, an illumination plane with a mask and with a projection objective, in which case, for reducing the coherence of a wavefront-emitting laser radiation, the laser beam impinging on a surface of a resonator body is partially reflected with a first partial beam, and a second partial beam of said laser beam entering the resonator body and emerging from the resonator body again after a plurality of total reflections at least approximately in the region of the entrance location and being forwarded with the first partial beam jointly to an illumination plane, characterized in that the resonator body (9, 9′) is formed in such a way that in addition to the splitting into partial beams (10a, 10b), the wavefronts of at least one partial beam (10b) are modulated during a laser pulse, the partial beams (10a, 10b) which are reflected at the resonator body (9, 9′) and which enter the resonator body (9, 9′) being superimposed downstream of the resonator body (9, 9′), and the resonator body (9, 9′) being provided with a phase plate (12) having varying local phase distribution.

26. The projection exposure apparatus as claimed in claim 25, characterized in that the phase plate (12) is formed as a diffractive optical element (DOE) which is optimized to the zeroth order of diffraction.

27. The projection exposure apparatus as claimed in claim 25, characterized in that a diffusing screen is provided as the phase plate (12).

28. The projection exposure apparatus as claimed in claim 25, characterized in that the resonator body (9, 9′) is formed as a prism having at least five corners.

29. The projection exposure apparatus as claimed in claim 25, characterized in that the optical path length of the second partial beam (10b) in the resonator body (9, 9′) is a multiple of the temporal coherence length.

30. The projection exposure apparatus as claimed in claim 25, characterized in that at wavelengths of the laser beam (10) of 157 nm or less, calcium fluoride is used as the resonator body (9, 9′).

31. The projection exposure apparatus as claimed in claim 26, characterized in that the resonator body (9, 9′) is provided with a phase plate (12) having varying local phase distribution.

32. The projection exposure apparatus as claimed in claim 25, characterized in that the prism (9′) is formed in asymmetrical fashion.

33. The projection exposure apparatus as claimed in claim 25, characterized in that the position of the centroid beam of the laser beam (10) impinging on the resonator body (9, 9′) is eccentric.

34. The projection exposure apparatus as claimed in claim 25, characterized in that the surface (11) of the resonator body (9, 9′) on which the laser beam (10) impinges is provided with a splitter layer (17) in such a way that it influences the entrance angle of the partial beam (10b) enter-

ing the resonator body (9, 9').

35. The projection exposure apparatus as claimed in claim 34, characterized in that the splitter layer has a varying thickness and/or is formed a non-homogenous fashion.

36. The projection exposure apparatus as claimed in claim 34 or 35, characterized in that the splitter layer has a dielectric layer.